(12) UK Patent Application (19) GB (11) 2 266 429 (13) A

(43) Date of A publication 27.10.1993

(21) Application No 9308045.5

(22) Date of filing 19.04.1993

(30) Priority data
(31) 04100094 (32) 21.04.1992 (33) JP

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(51) INT CL[5]
H04M 1/02

(52) UK CL (Edition L)
H4J JK

(56) Documents cited
GB 2235850 A GB 2235606 A

(58) Field of search
UK CL (Edition L) H4J JAAB JK
INT CL[5] H04M 1/02 1/03
Online databases: WPI

(54) Portable telephone apparatus

(57) In a portable telephone apparatus, the length of its housing and the area of its display are altered between the operation and stand-by states. In the operating state, the first display 4 and the second display 3 are activated to present information. In the stand-by state, only the first display 4 is activated. In the stand-by state, to minimise the size of the housing, only the indispensable information items such as the battery power remaining and in-service-area designation are presented, thereby enabling the apparatus to take up less space. In the operation state, the housing is elongated by sliding the two casing parts 5, 6 apart such that the distance between the transmitter 1 and the receiver 2 is similar to that between the mouth and the ear of the user to improve the speech quality in the telephone call. Moreover, the display area is increased to permit display of an inputted number to be dialled.

FIG. 2A

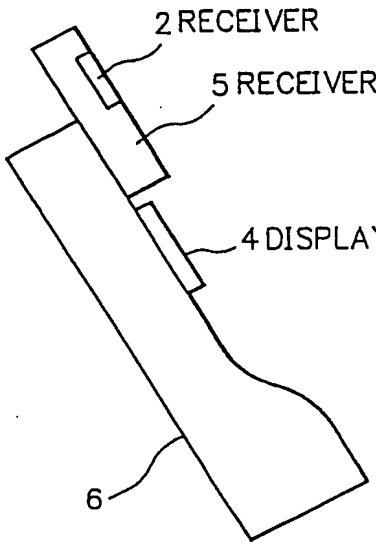
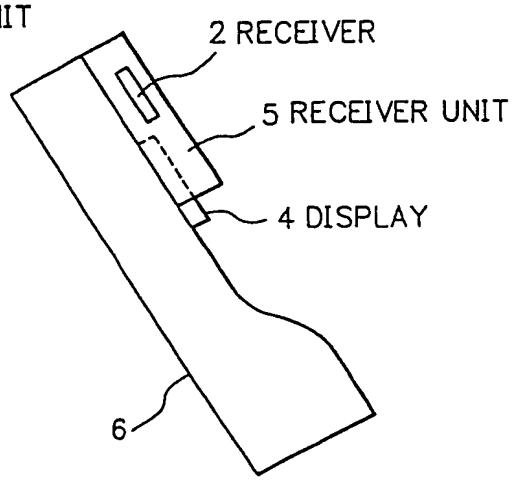


FIG. 2B



GB 2 266 429 A

FIG. 1A

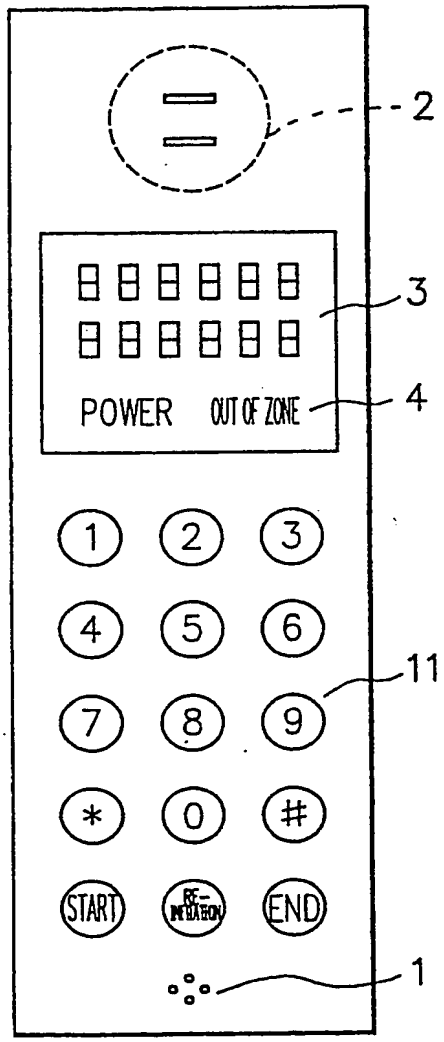

2
3
POWER
OUT OF ZONE
4
1
2
3
4
5
6
7
8
9
11
*
0
#
START
RE-INITIATION
END
1

FIG. 1B

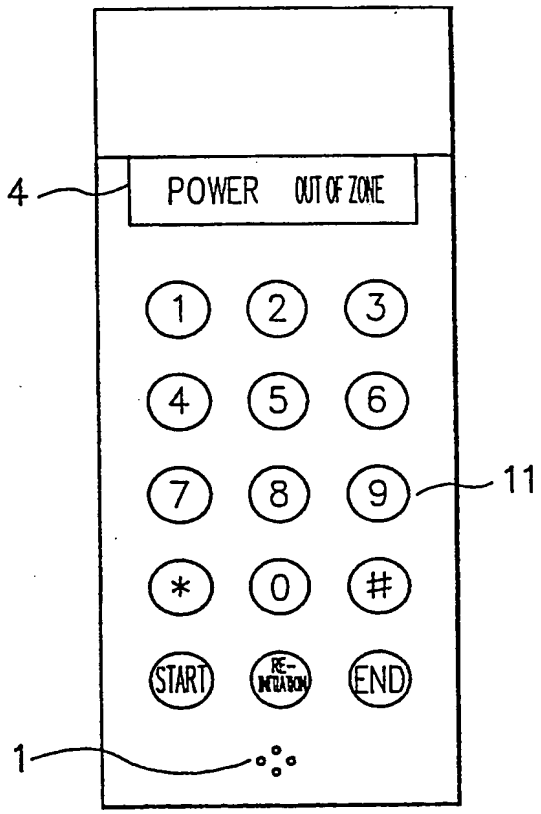

4
POWER
OUT OF ZONE
1
2
3
4
5
6
7
8
9
11
*
0
#
START
RE-INITIATION
END
1

FIG. 2A


2 RECEIVER
5 RECEIVER UNIT
4 DISPLAY
6

FIG. 2B

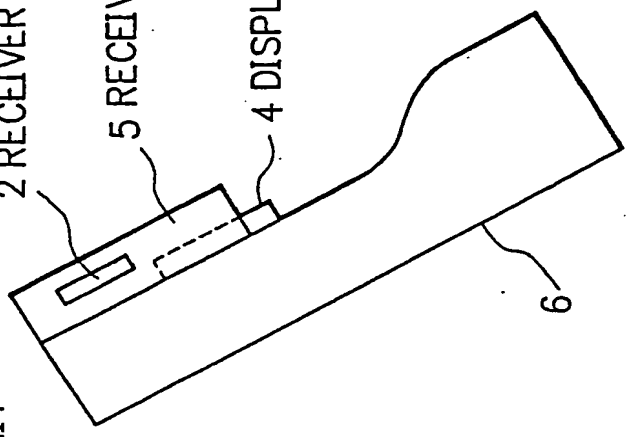
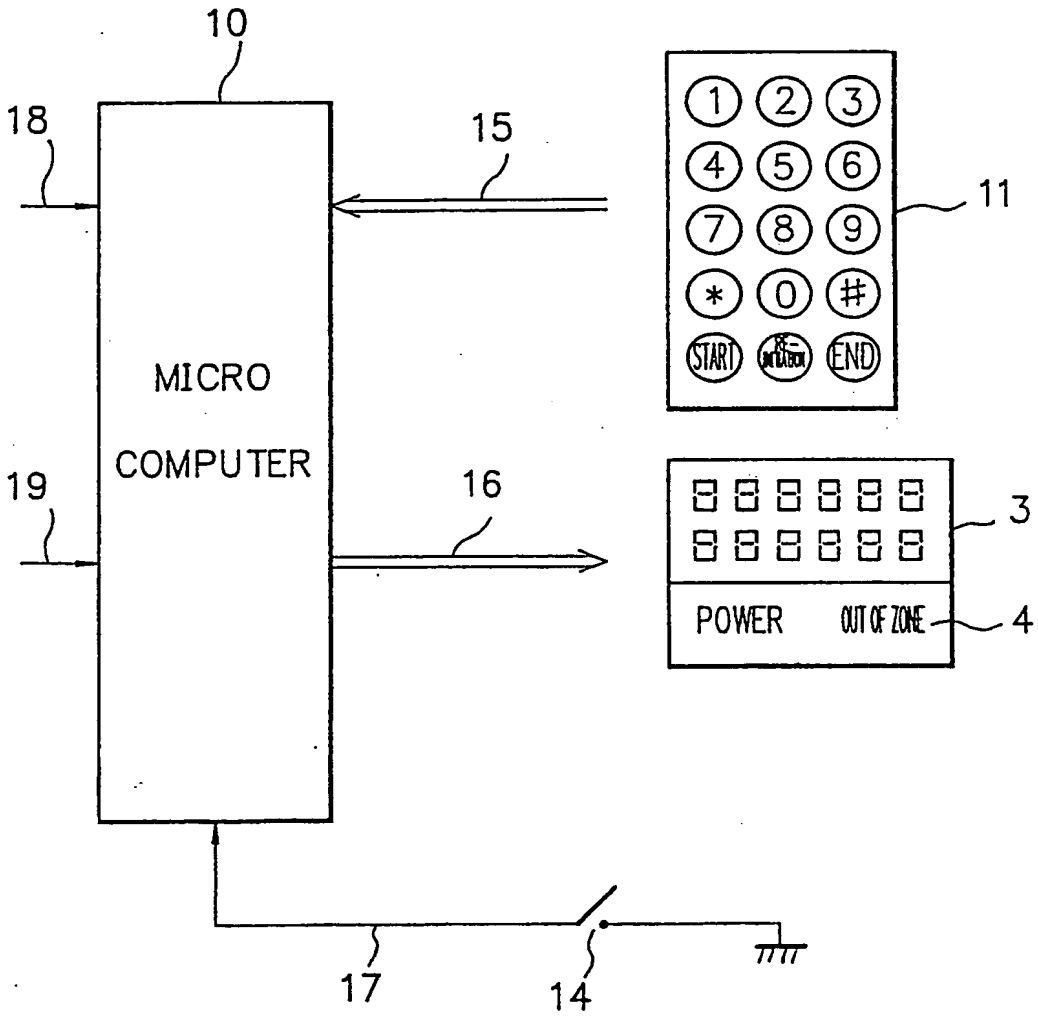

2 RECEIVER
5 RECEIVER UNIT
4 DISPLAY
6

FIG. 3


10
18
15
11
1
2
3
4
5
6
7
8
9
*
0
#
START
END
MICRO
COMPUTER
19
16
3
POWER
OUT OF ZONE
4
17
14

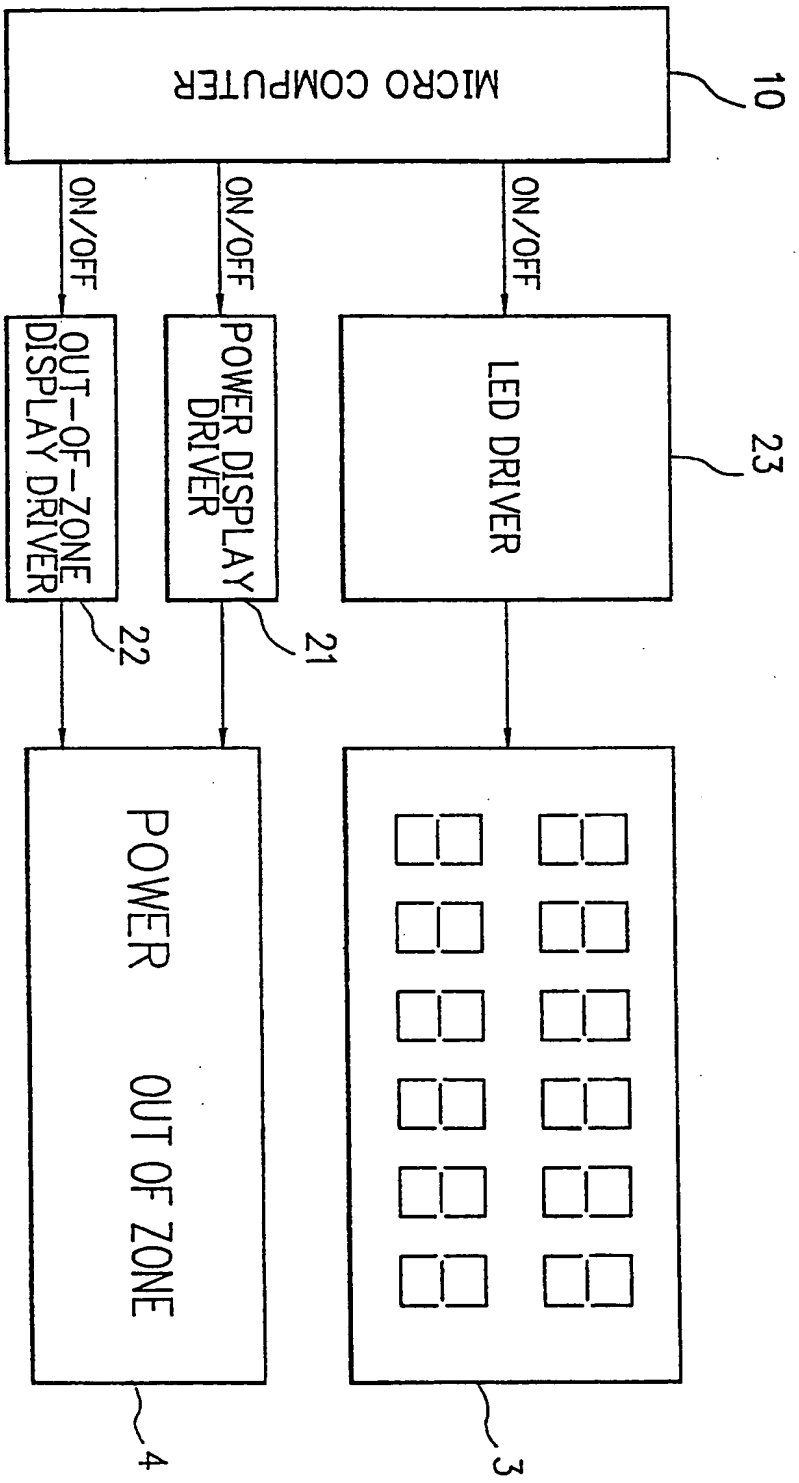
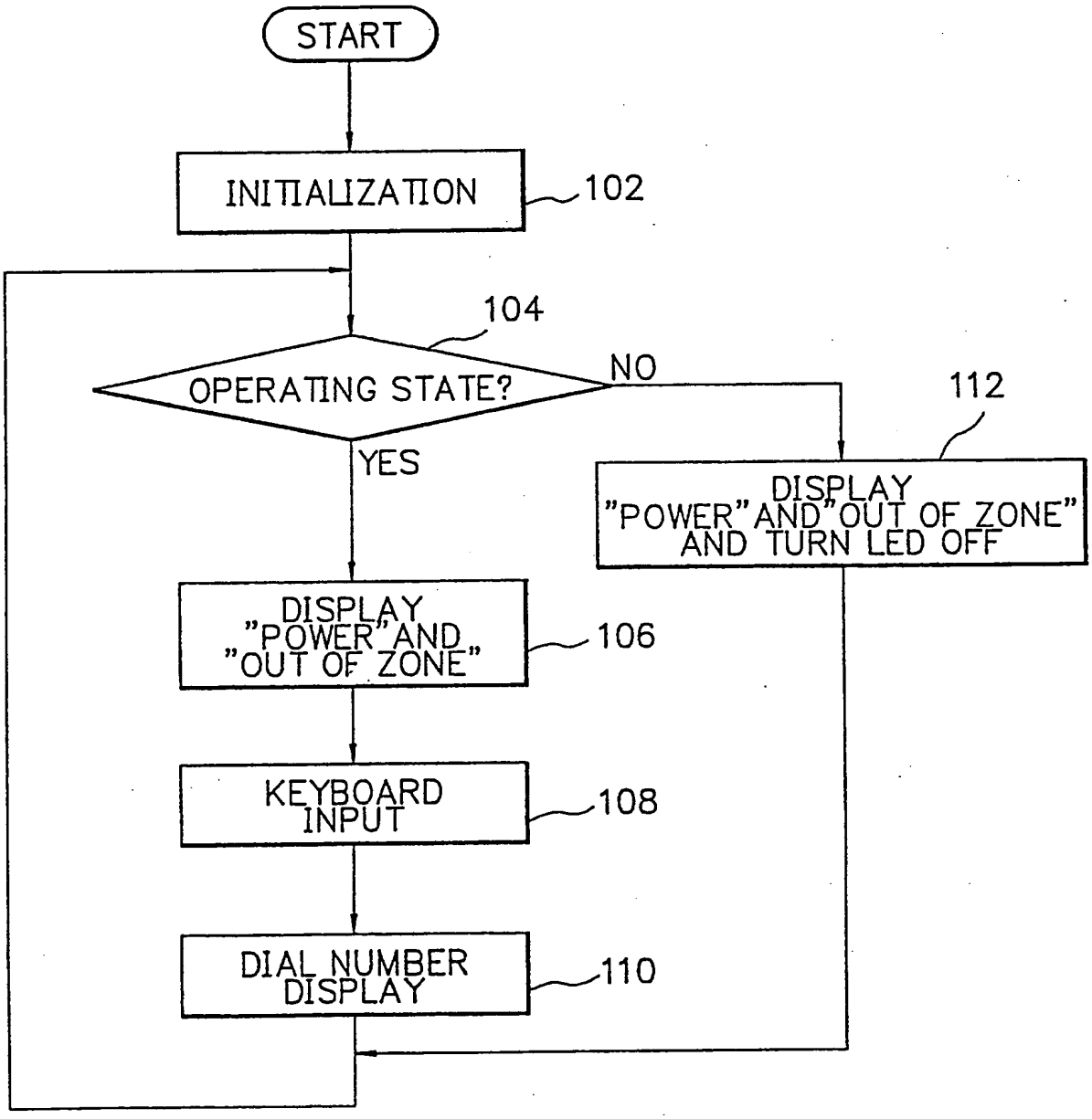

MICRO COMPUTER
10
ON/OFF
ON/OFF
ON/OFF
OUT-OF-ZONE DISPLAY DRIVER
POWER DISPLAY DRIVER
LED DRIVER
23
22
21
POWER
OUT OF ZONE
4
3

FIG. 4

FIG. 5


START
INITIALIZATION
102
104
OPERATING STATE?
NO
YES
112
DISPLAY "POWER" AND "OUT OF ZONE" AND TURN LED OFF
DISPLAY "POWER" AND "OUT OF ZONE"
106
KEYBOARD INPUT
108
DIAL NUMBER DISPLAY
110

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PORTABLE TELEPHONE APPARATUS

The present invention relates to portable telephone apparatus, and in particular, to portable telephone apparatus having a display function.

According to current trends in the production of portable telephone facilities and apparatus, it is to be expected that the weight and the size thereof will be much more reduced.

Conventionally, a portable telephone set includes a radio section to provide communication, a voice transmitting section (microphone) and a voice receiving section (receiver) which achieve signal transformation between voice and electronic signals, and a keyboard section to input numbers to be dialled and the like.

Moreover, a portable telephone device may also include a display unit to display, for example, a number to be dialled which is inputted from the keyboard unit.

In the known telephone device, the distance between the transmitter or microphone and the receiver or loudspeaker is determined by the distance between the positions respectively of the mouth and the ear of the user. Consequently, in the operation state of the telephone apparatus, a certain vertical length of about 15 to about 20 centimeters (cm) is necessary. On the other hand, in the stand-by state (or wait or storage state), the length of the telephone which is necessary in the operating state is inconveniently long. In consequence, it has been proposed to minimize the length in the stand-by state. However, having regard to human engineering, the keyboard unit is operated by a human operator and hence requires an appropriate size thereof for operation. Similarly, the display necessitates a certain proper size for the operator to recognize items presented thereon easily. In consequence, in the structure in which the length of the telephone apparatus is reduced in the stand-by state thereof, it is necessary, for example, to minimize the size of the display in its original form.

In accordance with the present invention, there is provided a portable telephone apparatus comprising a first casing including a first display section for achieving a first display operation in a stand-by state of the apparatus and a second display section for displaying information containing a number to be dialled in an operation state thereof; a second casing slidably connected to the first casing; and detecting means for detecting the operation and stand-by states of the apparatus; wherein the length of the apparatus can be changed between the operation and storage states by sliding the second casing relative to the first, and, in the stand-by state, the second display section is concealed by the second casing.

The present invention will be described in more detail, by way of example, in the following detailed description, taken in conjunction with the accompanying drawings, in which:-

Figures 1A and 1B are diagrams showing the appearance of the upper surface of a portable telephone set in an embodiment in accordance with the present invention;

Figures 2A and 2B are diagrams showing side views of the portable telephone set in the embodiment of Figures 1A and 1B;

Figure 3 is a block diagram schematically showing the constitution of the portable telephone set of the embodiment;

Figure 4 is a block diagram for explaining the display driving function of the portable telephone set of the embodiment; and

Figure 5 is a flowchart showing the operation of the portable telephone set of the embodiment.

Referring now to the drawings, the preferred embodiment in accordance with the present invention will be described. Figures 1A and 1B show the appearance of the front surface of a portable telephone apparatus in the operation and stand-by states respectively in the embodiment in accordance with the present invention.

The apparatus of this embodiment uses radio communication. Consequently, the apparatus needs to have a function display to tell the user in actual operation whether or not the apparatus is in a service area where the radio signal can be received. Furthermore,

it is also necessary to tell the user whether or not the battery of the apparatus has sufficient power remaining.

The telephone set includes a display 3, 4 as shown in Figure 1B. The display provides these required operations, namely, function display. More particularly at the lower portion 4 of the display, the display of "Power" is turned off when the apparatus is not being supplied with power. The display is turned on when the apparatus is being powered and the power capacity remaining in the battery is sufficient. The display blinks or flashes when the battery capacity is lowered to a battery alarm state. In addition, an "Out of zone" display is turned off when the apparatus is in the service area where the radio signal can be received. The display is turned on when the telephone set is out of the service zone, namely, in any area where the radio signal cannot be received. In the upper portion 3 of the display, there is disposed a display to present the number to be dialled in the operation state of the telephone.

The telephone device further includes a transmitter or microphone 1 and a receiver or loudspeaker 2.

Figures 2A and 2B are side views showing the operation and stand-by states respectively of the telephone set, and which correspond to Figures 1A and 1B. As can be seen from these figures, the apparatus is formed with a movable structure using a sliding action. When the apparatus is employed for communication, a receiver unit 5 including the receiver 2 is moved upward relative to the main body 6 of the apparatus as shown in Figure 2A. Namely, the displays 3 and 4 are entirely open to the exterior and hence the front surface thereof can be monitored by the user. On the other hand, in the stand-by state, in which the apparatus is powered to await a call from a sender, the overall length of the apparatus is reduced. Namely, the receiver 2 of the receiver unit 5 is retracted as shown in Figure 2B. In this situation, only the display 4 achieving the necessary function display of "Power" and "Out of zone" shown in Figures 1A and 1B can be seen by the user. Namely, there the display 3 accomplishing the dial display is concealed as it is unnecessary in this state.

Figure 3 illustrates by way of a block diagram the functions of the apparatus shown in Figures 1A, 1B, 2A and 2B. In this regard, any constituent components not directly related to the present invention are omitted from this diagram, for example, means for determining whether or not the apparatus is in a region where communication is possible. In this structure, a micro-computer 10 determines the operation and stand-by states of the apparatus in dependence on a signal supplied from an input signal line 17 via a micro-switch 14 so as to control the input from a keyboard 11 and the display on the displays 3 and 4. That is, when the apparatus is in the operating state, the contact of the micro-switch 14 is open and not conductive; whereas, when the apparatus is in the stand-by state, the contact is closed and conductive. The micro-computer 10 checks the logic level of the input signal 17 to determine the operation or stand-by state in accordance with the level (H or L) thereof. When the stand-by state is detected as a result of this check, the micro-computer 10 initiates via an output signal line 16 a display operation for only the display 4. When the operating state is detected, the micro-computer 10 initiates a display operation for both of the displays 3 and 4 via the line 16. In addition, also when a numeric key input is received from the keyboard 11 via an input signal line 12, the micro-computer 10 carries out a display operation for the displays 3 and 4 via the output line 16.

Figure 4 is a diagram for explaining the control operation of the micro-computer 10 to drive the displays 3 and 4. As shown in this figure, the micro-computer 10 is connected to the display 4 via a power display driver circuit 21 to drive the "Power" display and an out-of-zone display driver circuit 22 to drive the "Out of zone" display. The driver circuit 21 activates the "Power" display of the display 4, whereas the driver circuit 22 drives the "Out of zone" display of the display 4. The computer 10 is further linked to the display 3 via a circuit 23 to drive light emitting diodes (LEDs). The driver circuit 23 controls the LEDs of the display 3 to display a number being dialled on the display 3.

Now the display operation of the apparatus will be described by reference to the flowchart of Figure 5. First, an initial setting operation is carried out (step 102). Next, the micro-computer 10 recognises whether the apparatus is in the operation or stand-by state from the signal 17 of Figure 3 (step 104). In the operating state, the computer 10 checks a signal 18 inputted thereto to indicate whether or not the apparatus is powered and the battery power is sufficient. Depending on the signal 18, the computer 10 decides whether or not the word "Power" is to be presented on the display 4, and delivers a signal reflecting this decision to the driver circuit 21. In response to this signal, the driver 21 illuminates the word "Power" when the apparatus is powered and the battery power is sufficient. In other cases, the computer 10 causes the word "Power" to blink. Next, the computer 10 decides, in accordance with an out-of-zone/in-zone signal 19 supplied thereto, whether or not the words "Out of zone" are to be displayed so as to supply a resultant signal to the driver circuit 22. In response to this signal, the driver circuit 22 displays the words "Out of zone" on the display 4 when the apparatus is out of the communication zone (step 106).

Then the computer 10 checks a signal 15 inputted thereto to determine whether or not an operation has been initiated from the keyboard 11 of Figure 3 (step 108). If this is the case, display of a number being dialled is assumed to be required, and hence a driving signal is delivered to the LED driving circuit 23. In response thereto, the circuit 23 activates the LED unit to present the number being dialled on the display 3 (step 110).

When the apparatus is in other than the operation state in the step 104, the computer 10 checks, as in the step 106, the signal 18 inputted thereto indicating whether or not the apparatus is powered and the battery power is sufficient. According to the signal 18, the computer determines whether or not the word "Power" is to be presented on the display 4, thereby delivering a signal obtained as a result of the decision to the driver circuit 21. In response to this signal, the driver 21 illuminates the word "Power" when the apparatus is being powered and the battery power is sufficient; otherwise, the computer 10 causes the word "Power" to

blink. Next, the computer 10 decides, according to the out-of-zone/in-zone signal 19 supplied thereto, whether or not the words "Out of zone" are to be displayed so as to supply a resultant signal to the driver circuit 22. In response to this signal, the driver circuit 22 displays the words "Out of zone" on the display 4 when the apparatus is out of the communication zone. Moreover, the computer 10 supplies the LED driving circuit 23 with a driving signal forcibly turning the LED unit off, thereby setting the LED unit of the display 3 to the off state (step 112).

Thus, with the apparatus described above, even in the stand-by state (wait or storage state) thereof, the user can determine the availability of the apparatus without setting the housing of the apparatus to the elongated operation state of Figure 1A. Furthermore, in the stand-by state of Figure 1B, although the receiver 2 shown in Figure 1A is concealed in the casing and hence the user cannot conduct a telephone call in this state, the apparatus is sufficiently small that it can be conveniently stored in the pocket of a jacket or the like.

On the other hand, in the operating state in which the apparatus is elongated or extended as shown in Figure 1A, the distance between the transmitter 1 and the receiver 2 is similar to that between the mouth and the ear of the user. This possibly improves the characteristics of the telephone set such as the speech quality. Moreover, in the operating state, since the display area of the apparatus is enlarged and hence the number to be dialled may possibly be displayed thereon during the keying-in operation.

The telephone apparatus illustrated is configured with the following structure, namely, there is provided a display unit for displaying the number to be dialled and other functional information, the length of the housing can be changed between the operation and stand-by states thereof such that the display area is increased or decreased respectively, and the apparatus includes a detecting circuit to detect whether it is in the operation state or the stand-by state. In consequence, in the stand-by state, indispensable items of information such as the power remaining in the battery and the in-service-area presentation are displayed. As a result, there are obtained the advantages that, for example, the

size of the apparatus is reduced in the stand-by state and the usability thereof is improved in the operating state.

While the present invention has been described with reference to the particular illustrative embodiment, it is not to be restricted by the embodiment but only by the appended claims. It is to be appreciated that those skilled in the art can change or modify the embodiment without departing from the scope of the present invention.

CLAIMS

1. Portable telephone apparatus comprising:

a first casing including a first display section for achieving a first display operation in a stand-by state of the apparatus and a second display section for displaying information containing a number to be dialled in an operation state thereof;

a second casing slidably connected to the first casing; and

detecting means for detecting the operation and stand-by states of the apparatus;

wherein:

the length of the apparatus can be changed between the operation and storage states by sliding the second casing relative to the first, and in the stand-by state, the second display section is concealed by the second casing.

2. Apparatus in accordance with claim 1, wherein the first display section displays the state of a power supply of the apparatus and information indicating whether or not the apparatus is in a zone in which telephone communication is possible.

3. Apparatus in accordance with claim 1 or 2, wherein the second display unit includes light emitting diodes (LEDs).

4. Apparatus in accordance with claim 1, 2 or 3, wherein the second casing includes a receiver, the receiver being arranged on a surface of the second casing in the operation state and being stored in the second casing in the stand-by state.

5. Apparatus in accordance with any preceding claim, wherein the first casing includes a keyboard for inputting therefrom a number to be dialled.

6. Portable telephone apparatus substantially as herein described with reference to the accompanying drawings.

Patents Act 1977
Examiner's report to the Comptroller under Section 17 (The Search Report)

Application number
GB 9308045

Relevant Technical fields

(i) UK Cl (Edition L) H4J (JK,JAAB)

(ii) Int Cl (Edition 5) H04M 1/02, 1/03

Search Examiner
P J EASTERFIELD

Databases (see over)

(i) UK Patent Office

(ii) ONLINE DATABASES: WPI

Date of Search
2 JUNE 1993

Documents considered relevant following a search in respect of claims

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
A	GB 2235850 A (PLESSEY)	
A	GB 2235606 A (TECHNOPHONE)	

Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

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&: Member of the same patent family, corresponding document.

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